REMARKS

Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested.

Claims 1-27, 33, 34, and 37-40 are in this Application. Claims 17-25 and 33 have been withdrawn from consideration. Claims 1-5, 7, 11-13, 15, and 34-36 have been rejected under 35 U.S.C. § 102. Claims 6, 8-10, 26 and 27 have been rejected under 35 U.S.C. § 103. Claims 13, 14 and 16 are objected to. Claims 28-32 have been canceled in a previous response. Claims 35 and 36 have been canceled herewith. Claims 1, 10-13, 16, 26, 27 and 34 have been amended herewith. New claims 37-40 have been added herewith.

Amendments To The Claims

35 U.S.C. § 102 Rejections

Claim 1

Claim 1 is said to be anticipated by US patent 6,696,686 to Wainer et al. Claim 1 has been amended, adding a limitation that the sensor module comprises at least one second radiation detector, in addition to the at least one first radiation detector, also capable of receiving radiation from the source and producing an output signal. A further added limitation states that the CPU is designed and configured to use a comparison of the output signals from the at least one first radiation detector and the at least one second radiation detector to determine a plane in which the source resides. The applicant submits that amended claim 1, at least, is neither anticipated nor obvious from Wainer et al.

Amended claim 1 is supported, for example, by page 16, lines 21-29. These lines state that radiation detector 22, which is defined earlier, for example on page 10, line 1, as being part of sensor module 20, includes at least one first radiation detector 22A and at least one second radiation detector 22B, and that the system relies upon comparison of output signals from the at least one first radiation detector and the at least one second radiation detector to determine a target angle of rotation 32, which in turn is employed to determine a plane in which the radiation source resides. Page 14,

lines 19-22, state that, in some embodiments of the invention, it is the CPU that translates the output signal into information about a plane in which the radiation sources resides. For the record, it should be noted that, as stated on page 15, lines 21-26, "CPU" can refer to a single unit, or collectively to a plurality of units, for example to processors installed in the sensor modules.

Wainer et al does not describe a system that is used to determine the location of a localized source of radiation. Rather, Wainer et al describes a system used to create a nuclear image of the breast, showing the distribution of an extended source of radiation in the breast. This is done with several gamma cameras, each consisting of an array of detectors with collimators, oriented at different angles to the breast, or with a single such gamma camera that moves around to view the breast from different angles. As stated in column 8, lines 30-34 of Wainer et al, the output from each camera is sent to a computer which analyzes the results and produces cross-sectional views of the breast, i.e. a three-dimensional image of the breast. Column 8, lines 49-51, describes using "iterative (ART) methods, as known in the art" to reconstruct such a three-dimensional image. Even if such a system were used to image and locate a single localized source of radiation, which is not described in Wainer et al, there is no reason to think that the system would first determine a plane where the source resides, before finding a three-dimensional location of the source. On the contrary, the system described by Wainer et al, if it were used to image a single localized source, would not make use of any knowledge that the source is localized, but would simply produce a map of the distribution of radioactivity in three dimensions. Only after such a map were produced would it be possible to see that the source is localized, and to find out where the source is located, additional steps that are not described by Wainer. There is no motivation or suggestion in Wainer et al to use prior knowledge that the source is localized, and to initially determine a plane where it is located, before finding its three-dimensional location. Indeed, there is no motivation or suggestion in Wainer et al to use the system to locate a single localized radiation source at all.

It should be noted that the method described by Wainer et al is designed to determine the shape and size of a distributed source of radioactivity. If it is known in advance that the source is effectively a point source and only its location is wanted, or if only the center of mass of the source is wanted, which is not the case in Wainer et

al, then the method of claim 1 may be much more efficient. For example, using the method of claim 1, as stated on page 11, line 27 to page 12, line 2, the position of a localized source can be found 10 times a second, using a source that is weak enough to pose no significant risk to either the patient or an operator.

Dependent claims

Dependent claims 2-5, 7, 11-13, 15, and 34-36, which are also said to be anticipated by Wainer et al, are patentable at least because of their dependence on amended claim 1. Some dependent claims are also patentable for other reasons.

Claims 11 and 12 have been amended to be consistent with amended claim 1, making it clear that the at least two output signals in claim 11, and the at least three output signals in claim 12, refer not to the output signals from first and second radiation detectors that are used together in claim 1 to determine a plane where the source resides, but refer rather to output signals, for example from different sensor modules, that each define a separate plane where the source resides. Amended claims 11 and 12 are supported, for example, by page 14, lines 29-34. That the three planes are used to determine a point of intersection, as stated in amended claim 12, is supported, for example, by page 15, lines 27-33, which also make it clear the three output signals can, but need not, come from three different sensor modules.

Amended claims 11 and 12 are also patentable over Wainer et al, because they determine a line or a point at which the radiation source is located, by finding the intersection of two or three planes on which the radiation source is located. Wainer et al does not describe or suggest locating the radiation source by first determining two or three planes on which the radiation source is located, and finding the intersection of the planes.

Claim 16 has also been amended to be consistent with amended claim 1, replacing "wherein said directional information is produced" with "wherein said plane is determined."

New claims dependent on claim 1

New claims 37-40 are patentable at least because of their dependence on amended claim 1, and for other reasons as well. New claim 37 includes the limitation

that the system includes a displacement mechanism, which is controlled to track the radiation source in response to radiation received, and new claim 38 specifies that the tracking keeps the radiation source within boundaries where the source can be more accurately located by the system. Wainer et al does not describe or suggest such features. Although Wainer et al may describe the moving of radiation detectors, this is not done in response to radiation received, but only in a fixed pattern for scanning the breast to produce an image of it.

New claim 37 is supported, for example, by page 16, lines 5-8, which state that "rotation mechanism 26 [of sensor module 20] may be operated by feedback from 28 from radiation detector 22 according to a rule with amount of received radiation as a variable. Alternately, rotation mechanism 26 may be operated by a signal from CPU 42 according to a rule including amount of received radiation..." That only a portion of the sensor module may rotate, for example only the detectors or only the shields, or that translational motion may be used instead of or in addition to rotation, is supported by page 3, lines 17-20, which state, "Optionally, sensors for detection of radiation from the source achieve the desired angular sensitivity by rotation of at least a portion of the sensor about an axis through a rotation angle. For example, detectors or radiation shields may be rotated. Alternately or additionally, sensors may achieve the desired angular sensitivity by translational motion." The more general term "displacement mechanism," which includes both rotation and translation, is supported by page 6, lines 1-2, which states, "a displacement mechanism...imparts angular sensitivity to the sensor by moving...at least one functional component." That the rotation or translational motion can be used to track the source is supported by page 10, lines 15-18, which state, "This rotation allows tracking of the medical device as explained in greater detail below. According to various embodiments of the invention, rotational motion or translational motion may be employed..."

Claim 38 is supported, for example, by page 9, line 30, to page 10, line 6, which state, "a source 38 located within the boundaries 24 of detection (Figure 1) of sensor 20 may be accurately located by system 40 as radiation detector 22 of sensor module 20 is rotated through a series of rotation angles 32. A source 38 located outside of boundaries 24 will not be accurately located...According to some embodiments of the invention, sensor 20 may move to keep source 38 within

boundaries 24. The size and shape of boundaries 24 vary according to the configuration of sensor 20."

New claim 39 has the additional limitation, not described or suggested by Wainer et al, that the output signals are translated to directional information concerning the source, which is expressed as a plane in which the source resides. New claim 39 is supported, for example, by page 14, lines 19-22, which state, "CPU **42** is designed and configured to receive output signal **34** via channel of communication **48** and translate output signal **34** to directional information concerning radiation source **38**. This directional information may be expressed as, for example, a plane in which radiation source **38** resides."

Claim 34 has been amended to be dependent on new claim 39, instead of directly on claim 1.

New claim 40 has the additional limitation, not described or suggested by Wainer et al, that there are at least four sensors, that the at least four output signals are each used to determine a plane in which the source resides, and that the resulting overdetermined set of equations is solved to find a likely position of the source, taking into account an error defined by a Euclidean distance between each plane and the position. New claim 40 is supported, for example, by page 23, lines 16-29.

35 U.S.C. § 103 Rejections

Claims 6, 8-10

Claims 6 and 8-10 are said to be obvious from combinations of Wainer et al and other prior art. These claims are patentable at least because of their dependence on amended claim 1.

Claim 10 has been amended, not because of this claim rejection, but because of concern that the phrase "the medical device" in original claim 10 may lack an antecedent. Amended claim 10, which specifies that the radiation source is integrally formed with or attached to a medical device, is supported, for example, by page 1, lines 31-32.

Claim 26 and 27

Claims 26 and 27 are said to be obvious because they are broad enough to encompass any use of triangulation, including picking up a pen from a desk using binocular vision to locate the pen, using visible light (electromagnetic radiation) reflected from the pen. Claim 26 has been amended, adding a limitation that the source of radiation is a source of ionizing radiation, and specifying that a first and second plane in which the source resides is determined, rather than simply determining a first and second direction of the source. Claim 27 has been amended to be consistent with amended claim 26. The applicant submits that amended claims 26 and 27, at least, are not obvious.

In triangulation as it is normally practiced, for example in binocular vision, or by surveyors, an object is located on two different lines in three-dimensional space, by determining the direction of the object in space, from two different detectors. The location of the object in three-dimensional space is then found by finding an intersection of the two lines. The method used by Wainer et al for mapping a distribution of radioactivity in three-dimensional space might even be considered a generalization of such methods, since a two-dimensional array of collimated detectors is used to view the sources of radioactivity from many different directions in three-dimensional space. In claim 26, by contrast, a source of radioactivity is determined to be located on two or more different planes, and the intersection of the planes is used to locate the source in three dimensions. Nothing in Wainer et al, or in other prior art known to the applicant, suggests using such a method for locating a radioactive source, or even for locating an ordinary object using visible light.

Claim Objections

Claim 13 is said to be of improper dependent form for failing to further limit the subject matter of a previous claim. The limitation of claim 13 is said to be a mode of operation of the CPU, and not a further structural limitation of the apparatus. Claim 13 has been amended, to state that the CPU is configured to compute the position of the source repeatedly at predetermined intervals, which is a structural limitation of the CPU. This amendment is supported, for example, by page 15, lines 5-7, which state that "CPU **42** is often employed to compute the point of intersection repeatedly at

predetermined intervals so that a position of radiation source **38** as a function of time may be plotted…"

Claims 14 and 16 are objected to as being dependent on a rejected base claim, claim 1. The applicant submits that amended claim 1 is patentable, so this objection should be moot.

In view of the above amendments and remarks it is respectfully submitted that claims 1-16, 26, 27, 34, and 37-39 are now in condition for allowance. A prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

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Enclosures:

- Petition for Extension (One Month)
- Additional Claims Transmittal Fee